GEOLOGIC MAPPING OF VENUS: 1:10M SCALE MAP OF THE DEMETER CORONA QUADRANGLE.

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INTRODUCTION. This work is a part of joint project of Vernadsky Institute and Brown University on 1:10M scale photogeologic mapping of Venus [4]. The territory under study is in between 35 and 80ºN and 260 and 320ºE. Photogeologic analysis was done based on the digital format images, the maps of separate areas of the territory were also drawn digitally, and only final compilation of the total quadrangle map was made by the conventional cartographic tools.

REGIONAL STRATIGRAPHY. As the basis for the identification of the geologic units of the mapped area the model of regional and global stratigraphy suggested by Basilevsky and Head [1] and Basilevsky et al. [2] was used. In the process of mapping a new geologic unit, corona annulus (Co), with three subunits was identified. Besides several earlier suggested units of [1,2] were subdivided into subunits. To be identified as geologic unit the material should compose a terrain with characteristic morphology determined by the material-forming (lava eruption, impact cratering, etc.) and/or material-modifying (tectonic deformation) processes and it should have visible boundaries with other materials. The following is a short description of the identified geologic units (from older to younger):

Tessera terrain material (Tt). It composes tessera, the terrain with very rough morphology determined by several (at least two) intersecting systems of deformation. Tessera terrain typically forms islands among various plains which embay it. When tessera is in contact with the material of ridge belts (see below) the age relations between these two materials look ambiguous [5]. Compressional ridges typical for the ridge belts continue through the contact into the neighbouring tessera and character of the contact (embayment or tectonic boundary) is not clear.

Material of ridge belts (RB). It composes elongated areas of plains typically deformed by relatively broad sinuous ridges and embayed by the plains with wrinkle ridges (see below). Inter-ridge space is overlain sometimes by younger materials embaying the ridges. In some cases the ridge belts bear dense fracturing masking the separate elements of the belts.

Material of corona annulus (Co). It forms annulae of coronae: rings, their segments and arcs. Their surface is deformed by ridges and fractures with the trend which is in concentric alignment with general structure of the coronae. The ridges are resembling the ridges of the ridge belts except they are less sinuous than the RB ones. In some places when several coronae are neighbouring each others up to three subunits of the Co unit were identified based on apparent structural superpositions of the coronae.

Material of the densely fractured terrain (Pdf). It composes areas of apparent plains densely dissected by numerous fractures which are usually subparalel (within small areas) or radial to some corona or volcanic center. This unit is subdivided in some cases upto three subunits based on density of the fractures (more dense on older subunits) and visible boundaries between the subunits. Two lower subunits are embayed by the plains with wrinkle ridges (Pwr, see below), the upper one represents probably the material correlative to the Pwr unit fractured by later deformation.

Material of the plains with wrinkle ridges (Pwr). It composes primarily smooth plains deformed by wrinkle ridges. The ridges are more or less evenly distributed within these plains. Their trends are variable although some dominance of W-E trend is observed. This unit was divided into four subunits (from older to younger): The first is a material of mottled plains with densely spaced short wrinkle ridges and superposed on them another generation of wrinkle

ridges which is common for the upper three subunits too. The second is a material of plains with rather low homogeneous backscatter. The wrinkle ridges of the mentioned common for all Pwr plains generation of wrinkle ridges are the most prominent within this subunit. The third is material of plains with slightly higher backscatter and less prominent wrinkle ridges. The fourth is a material of relatively bright lobate plains deformed by the mentioned network of wrinkle ridges. The first of the subunits is probably specific of this area. The second and the third are probably the correlative to Pwr1 plains of [3], and the fourth is the correlative of Pwr2 plains of [3].

Material of shield plains (Psh). It composes fields of small often coalescing shields. Some of the shields are superposed on the Pwr plains, some are embayed by them, and for many of them the age relations with the Pwr plains are ambiguous.

Material of smooth plains (Psm). It composes relatively smooth plains typically having no wrinkle ridges. But in some cases wrinkle ridges are looking through this material giving an impression that the Psm material is a mantle overlaying the Pwr plains. At least in some cases the Psm materials are in evident association with some volcanoes, coronae and very young impact craters. Based on the backscatter (intermediate and low) the Psm unit is subdivided into two subunits.

Material of lobate plains (Pl). It composes lobate plains not deformed by wrinkle ridges. The Pl unit is subdivided into two subunits: one with homogeneously bright surface, another with many distinguishable flows within one lobate boundary.

Material of fracture belts (FB). It composes linear zones with numerous grooves and scarps cross-cutting various geologic units probably associated with rifts.

Material of impact craters (Cr). It composes impact craters and their ejecta with knobby morphology (subunit 1) as well as the crater outflows (subunit 2).

AREAL DISTRIBUTION OF THE UNITS. The mapped territory has high concentration of coronae and volcanic constructs with large caldera. These features probably make generally spotty distribution of various units within the territory including the remnant-type areas of tessera terrain and ridge belts. The areas of Pdf unit are often (but not always) in association with coronae. Young lobate plains associate typically with large volcanoes and calderas. Pwr plains occupy about 40-50% of the territory. For most of them (except the fourth subunit of the Pwr) no evident sources are visible.

THE GEOLOGIC HISTORY SCENARIO. The described sequence of the geologic units gives a ground to write a scenario of the geologic history of this area. The most ancient was emplacement of the materials and subsequent deformation of tessera and ridge belts. Then a formation of corona annulae and densely fractured terrain occurred with the Pdf formation more extended in time comparing to the Co formation. Next was formation of a complex of Pwr plains which was partly overlapped with later stages of the Pdf-forming events and with formation of the shield plains. Later was formation of the materials of smooth plains and volcanics of the lobate plains. The latest are some eolian landforms which were not mapped because of small areas they occupy.

REFERENCES:

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